OCCULTATION DIAMETER OF ASTEROID 1 CERES; W.B. Hubbard[1], L. A. Lebofsky[1], D. M. Hunten[1], H. J. Reitsema[1,2], B. H. Zellner[1], R. Goff[3], R. Marcialis[1], M. Sykes[1], J. Frecker[1], A. Sanchez I.[4], M. Rios H.[5], M. Izaguirre M.[6].

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Observations of stellar occultations by asteroids can provide a direct measure of the size and shape of the asteroid. Occultation diameters now exist for a number of asteroids (1,2). These direct diameter measurements can be used to recalibrate the standard thermal model for the determination of asteroid diameters and albedos (3) and for the development of new more sophisticated thermophysical models (4).

The occultation of the star BD +8° 471 by asteroid 1 Ceres was predicted to be observable on a path that passed through central Mexico and the Caribbean (5). Expeditions were sent to Mexico by the University of Arizona and Lowell Observatory. The Massachusetts Institute of Technology also sent several groups to the Caribbean. Approximately nine photoelectric chords were successfully obtained. We report here only the preliminary results based on observations obtained by the University of Arizona group and collaborators from several Mexican institutions. We observed from four sites in Mexico (two established observatories at Zacatecas and Guanajuato, and two portable stations set up at Mazatlan and Culiacan) with photoelectric systems described previously (1). The results described here were obtained from the stripchart output only, and thus are preliminary. The more accurate digital data should be analyzed by the time we report these results at the meeting.

The event occurred at about on the night of November 12, 1984 (about 4:45 UT November 13). High quality data for both immersion and emersion were obtained at two of our sites (Culiacan and Zacatecas). Because of high humidity, only the immersion was clearly observable from Mazatlan. Extremely high winds, causing severe image motion, resulted in very poor signal-to-noise measurements at Guanajuato, but when the digital data becomes available, we may be able to obtain reasonable timings for both immersion and emersion. Fig. 1 shows the stripchart record from Zacatecas, which has a representative signal-to-noise value for our observations.

For this preliminary analysis, we have assumed a spherical shape for the figure of Ceres. This results in the fit shown in Figure 2, and gives a diameter of 950 km. This diameter is in close agreement with the recalibrated radiometric diameter of Ceres (about 950 km) determined by comparing radiometric diameters of several asteroids with their diameters obtained directly for occultation measurements (3). More importantly, this occultation diameter is in good agreement with the diameter of Ceres (about 960 km) obtained by using a new thermophysical model and attempting to fit data for Ceres obtained at several wavelengths and over a range of phase angles (6).

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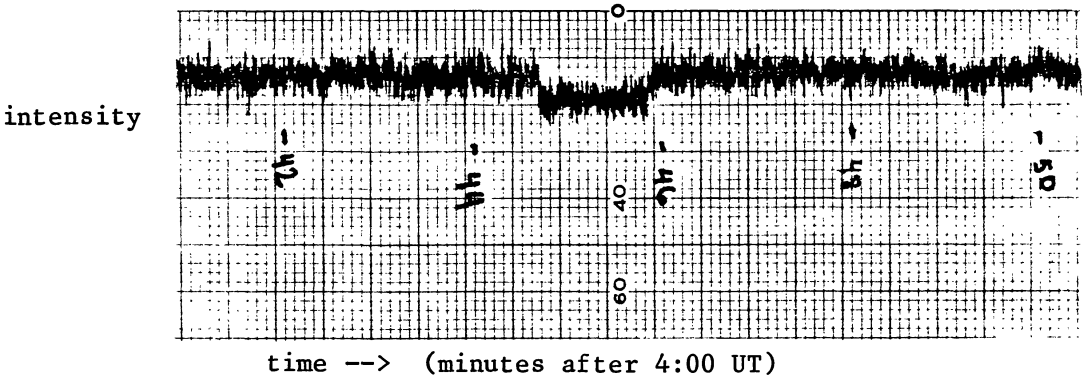

Fig. 1: Stripchart from Zacatecas observation.

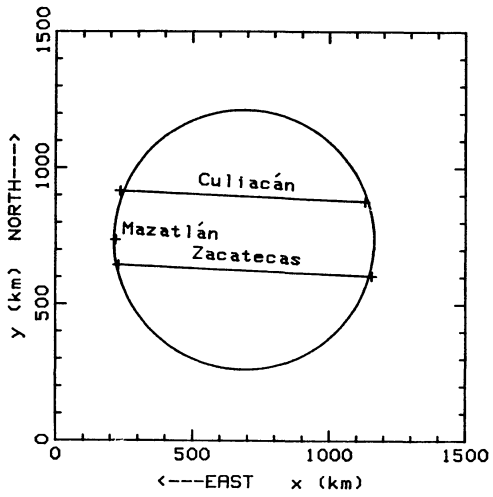

Fig. 2: Preliminary occultation profile of 1 Ceres.